

SD DATACOLOR

New multi-color displays for contrast enhancement and analysis
of scientific pictures and photographs

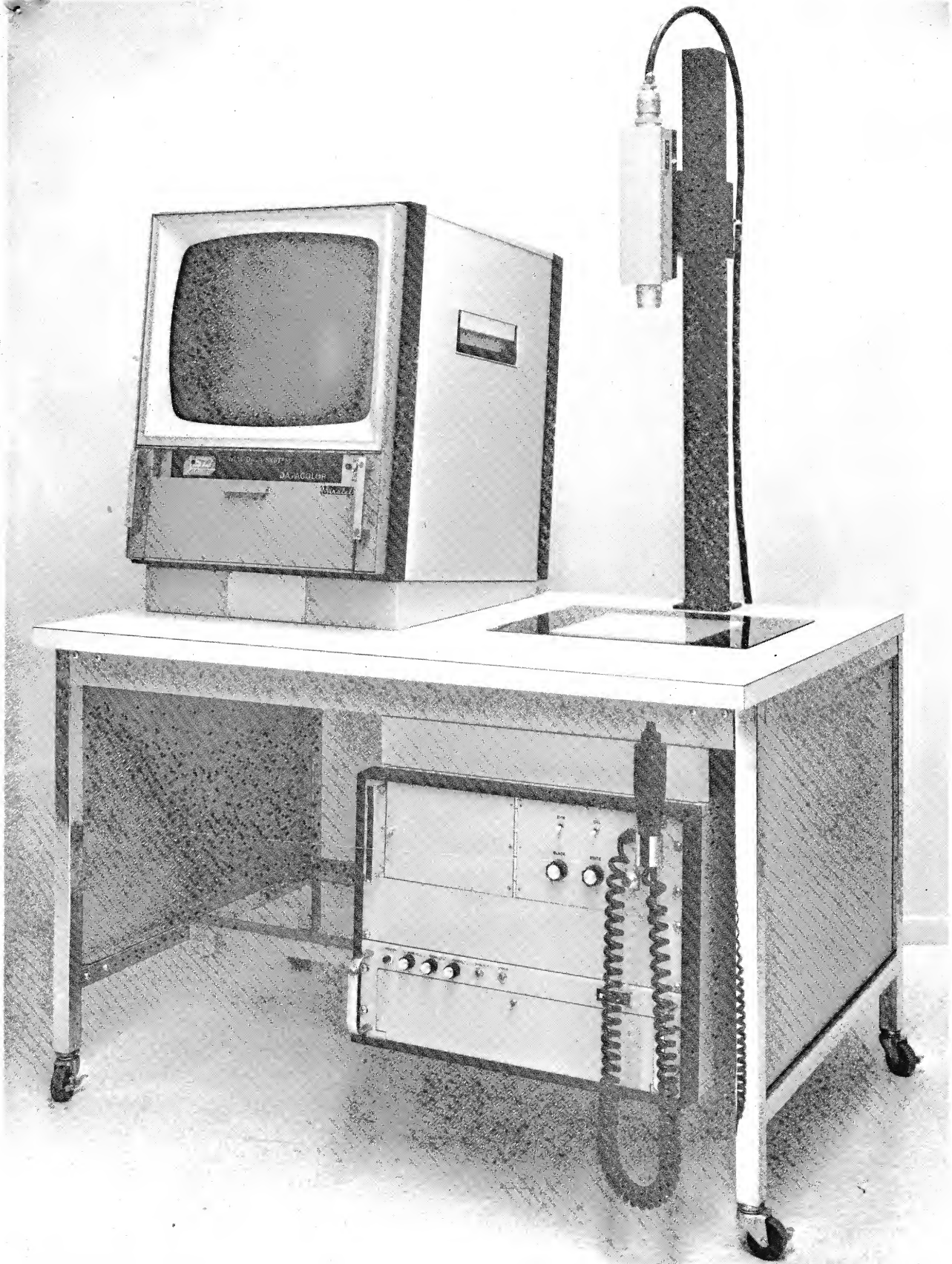
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INTRODUCTION

Spatial Data's Datacolor Systems convert, electronically and instantaneously, the shades of gray in an image or scene into a wide spectrum of colors. This new approach to image enhancement and analysis, using advanced television techniques combined with digital computer circuits, provides a real time color display without need for time-consuming photographic processing. Datacolor Systems are used both in photometry (in which brightness values in the scene or image are converted to colors), and in densitometry (in which density levels of a photographic transparency are converted into colors). In either process the color analysis is displayed on a computer-type color display for quantitative analysis and image enhancement.

MODEL 702 DATACOLOR SYSTEM



specifications subject to change without notice.

SPATIAL DATA SYSTEMS, inc.



132 AERO CAMINO, GOLETA, CALIFORNIA 93017

Printed in U.S.A.



Data Sheet

1970

MODEL 702 DATACOLOR SYSTEM

The model 702 Daticolor is a color densitometry system provided in a self-contained desk console. Back-lighted photographs are converted to a television video signal by a high-quality closed-circuit television camera which is adjustably mounted on a rugged vertical column so that it may be raised or lowered to accomodate both large and small transparencies.

The denisty values of the photograph are represented by the analog voltage levels of the video signal and are displayed in color on the Model 702 display. The analog levels are converted to digital values using a very high-speed (20 nanosecond) analog-to-digital converter that continuously converts the analog voltage to discrete values. Each value is presented to a number of digital-to-analog converters (three for each color) that produce the red, green, and blue analog signals for the three electron guns of the color monitor. The three colors are mixed on the screen of the color picture tube to produce the desired colors.

A remote color control varies the digitizing levels of the analog-to-digital converter so that the digitized values can be made to represent any range of brightness values. The red, green, and blue signals are available for operation of remote color monitors or, when encoded into compatible television signal by a standard television encoder, they may be transmitted over broadcast or closed-circuit television circuits.

A special logarithmic amplifier in the Model 702 makes each color band correspond to equal steps in the density of the photograph. Quantitative readings of brightness or density may be obtained by placing a calibrated photographic step wedge in the picture for reference. The steps may then be made to appear in different colors by adjustment of the color controls. These same colors will appear in the picture on those areas having densities corresponding to the step wedge.

SPECIFICATIONS MODEL 702 DATACOLOR

DISPLAY:

Number of Colors: twelve, including black and white, corresponding to eleven intervals of density.
Standard Color Order: (from white to black) white, dark blue, light blue, light green, dark green, olive yellow, brown, red, magenta, violet, black. (Other colors available on special order.) Monochrome may be substituted for black, using front panel switch.

ACCURACY:

The video signal is converted to a true logarithmic density scale over the range 0 to 2 (1% to 100%) within $\pm 3\%$ of full scale.

DENSITY RANGE:

The full range of densities in the video signal may be analyzed using as few as five colors or any portion may be analyzed using as many as twelve.

MONOCHROME:

Remote switch allows original monochrome (black and white) picture to be displayed.

OUTPUTS:

Separate red, green, and blue video signals available on rear panel as well as composite monochrome, 1 volt peak to peak, 75 ohms.

FILM SIZE:

12" x 16" maximum; masks provided for 9½" x 9½", 5" x 5", and 2¾" x 2¾" viewing areas.

SMALLEST VIEWING AREA: 1½" x 1½".

LIGHT BOX ILLUMINATION:

More than 1,000 foot candles. Variation over entire screen less than 5%.

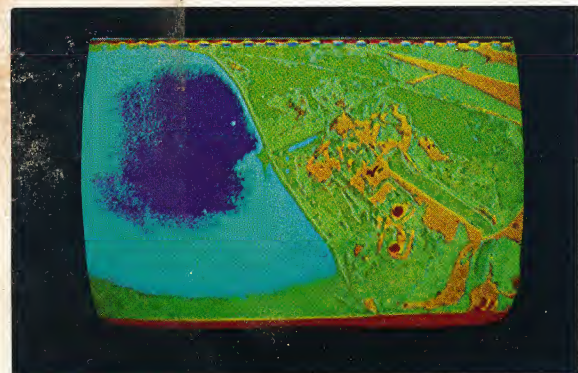
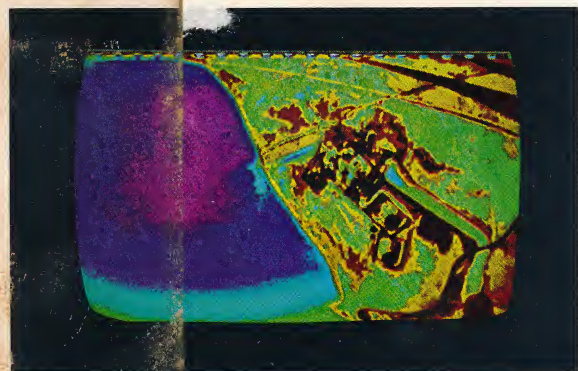
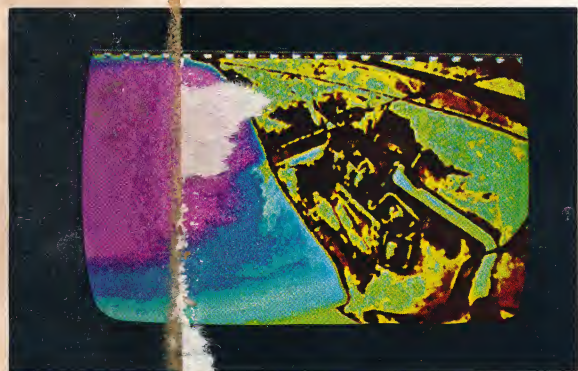
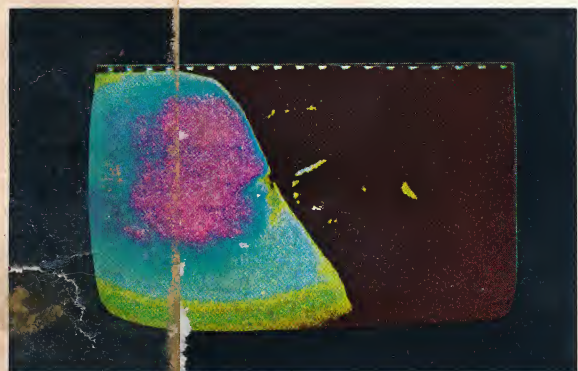
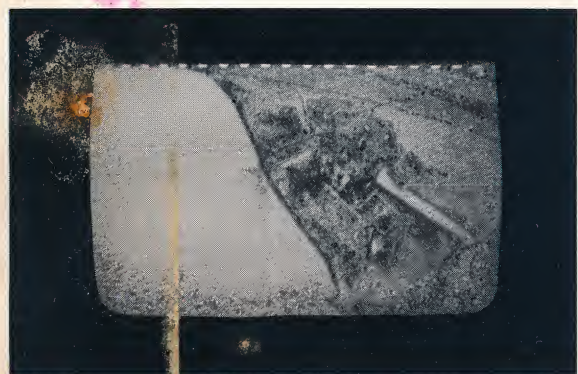
SHADING IN VIDEO OUTPUT:

Less than a density change of 0.05 (change in light transmission of 10%) over the center area of the picture within a circle whose diameter is 0.8 of the picture height.

POWER: 117 volts, 60 cycles, 650 watts.

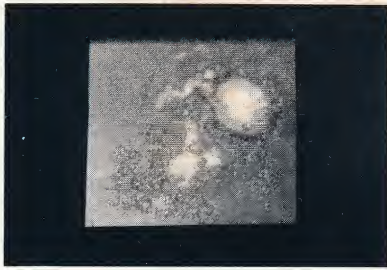
DIMENSIONS: 46" wide x 30" deep x 63" high.

Specifications are subject to change without notice.
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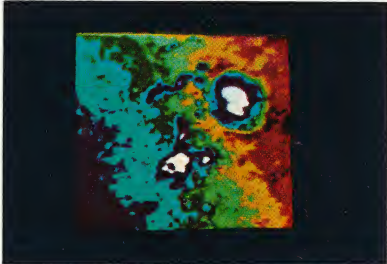


CHANGE COLORS INSTANTLY

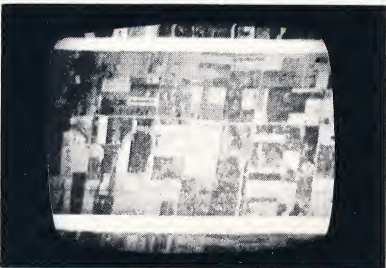
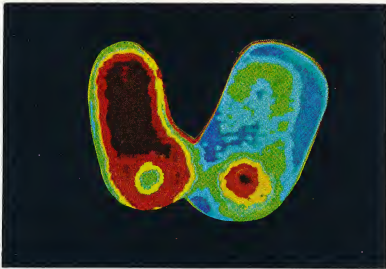
Dynamic color, under immediate control of the operator, is a unique feature of Datacolor Systems. Simple controls provide continuous adjustment of the color display so that any part of the gray scale may be analyzed in detail. The series of photographs (left) typically illustrate the application of these controls. The infra-red photograph (at top) has two basic areas of interest — the industry on land and the effluent emptying into the coastal water. The four color photographs show four of the infinite number of different color analyses that may be produced by adjusting the color controls. The warming of the water by the industrial effluent is clearly shown in the upper pictures, while the temperatures over the industrial plant are shown in detail in lower photographs. Thus, not only areas of especial interest may be shown in detail, but areas of known brightness (temperature) may be displayed in a particular color for quantitative readings. In addition to the dynamic color controls, the Datacolor Systems can substitute the black and white original scene for one of the colors. This technique is used to provide a normal picture for the lower brightness levels together with the color analysis of the highlights.



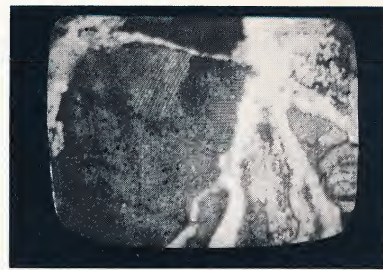
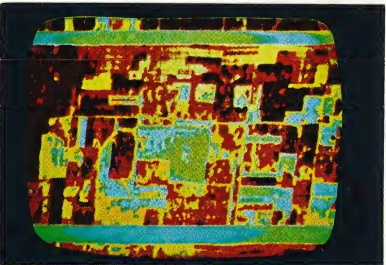
SUNSPOT GROUP TAKEN IN THE LIGHT
OF THE HYDROGEN SPECTRAL LINE



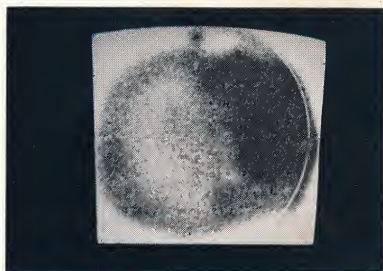
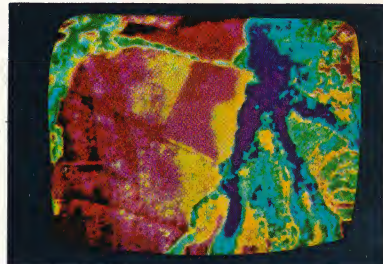
RECTILINEAR SCAN OF A
THYROID PHANTOM (*)



INFRA-RED AERIAL PHOTO OF AGRICULTURE
SITE FOR CROP IDENTIFICATION



INFRA-RED AERIAL PHOTO FOR ANALYSIS
OF CROP DISEASE AND IRRIGATION



SCINTIPHOTO, RIGHT LATERAL VIEW
OF BRAIN, POSITIVE FINDINGS (*)

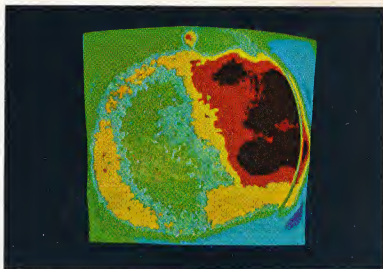
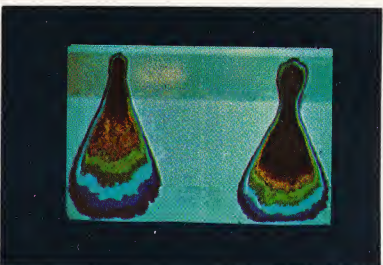


PHOTO OF RADIOACTIVE
TEST SPECIMEN (‡)



SYSTEM OPERATION AND DESCRIPTION

SD Datacolor Systems use a black and white television camera, video recorder, or video film scanner to produce a standard television signal. A special digital video processor analyzes the shades of gray in the television signal. The gray shades are classified into one of many categories (ten or more categories are used in **SD** Datacolor Systems). A different color is assigned to each category; the appropriate color television signal for the color is generated by the digital processor. The final result is a complete color signal suitable for operation of a color monitor unit. The colors on the monitor correspond to the shades of gray in the original black and white picture. When the Datacolor System is used as a photometer, the television camera picks up the brightness levels directly from the scene or image. Cameras may be adapted to telescopes, microscopes, spectrographs, infra-red image converters, and other optical instruments. The result is a dynamic, real time "motion picture" display of brightness values. When the Datacolor System is used as a densitometer, the photographic transparency is placed in front of the light box viewed by the television camera. Motion picture film may be analyzed using a video scanner in place of the camera. The output of the Datacolor System may be transmitted over color television systems for remote viewing. The color signal may be recorded on video magnetic tape or on color film. Datacolor Systems are used to make quantitative readings of brightness or density by placing a calibrated photographic step wedge in the picture for reference. The steps of gray are then made to appear in different colors by adjustment of the color controls. An area in the image having a brightness corresponding to a step on the wedge will have the same color. The accuracy of a system is limited only by the noise and shading in the television camera. Typically, twenty or more shades of gray may be resolved. Geometric resolution of a Datacolor System is comparable to that obtained in studio-quality 525 line color television systems.



SPATIAL DATA SYSTEMS, INC. 132 aero camino • goleta, california 93017
pioneers in 3-D plotting and digital television processing
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